

Appl. No. : 10/690,833  
Filed : October 22, 2003

### REMARKS

The following remarks are responsive to the January 10, 2006 Final Office Action. Claims 1-20 remain pending in the present application. Applicants respectfully request the Examiner to reconsider the above-captioned application in view of the foregoing amendments the following comments.

#### Claims 1, 19, and 20 Are Not Obvious in View of Uraki, Otsubo, and Friewald

Claims 1-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Uraki *et al.*, U.S. Patent No. 5,977,515 ("Uraki"), in view of Otsubo *et al.*, U.S. Patent No. 6,507,000 ("Otsubo"), and in further view of Friewald, U.S. Patent No. 6,693,255 ("Friewald"). Applicants respectfully traverse the present rejections.

#### **The Combination of Uraki, Otsubo, and Friewald Does Not Disclose the Laser Head Recited By Claims 1, 19, and 20**

In the January 10, 2006 Final Office Action, the Examiner cites Friewald as disclosing a laser ablation system that includes a vacuum system that removes material and vapor ablated from the workpiece. As disclosed by Friewald at col. 5, lines 40-44, "The cleaning head must permit some ambient air to enter the nozzle, in order to **cool the ablated material and dilute and entrain the ablated material for easier filtration**" (emphasis added).

#### *Claim 1*

By contrast, Claim 1 recites (emphasis added):

1. A laser head adapted to irradiate an interaction region of an inhabitable structure with laser light to remove material from the structure, the laser head comprising:

a housing;

a connector coupled to the housing and optically coupled to a laser generator, the connector adapted to transmit laser light from the laser generator;

at least one optical element contained in the housing and optically coupled to the connector, the optical element adapted to receive laser light from the connector; and

a containment plenum coupled to the housing, the containment plenum optically coupled to the optical element to receive the laser light from the optical element, the containment plenum adapted to confine the material and remove the material from the interaction region resulting from irradiating the structure with the laser light, **wherein the containment plenum is either air-cooled or water-cooled.**

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Thus, unlike Friewald, Claim 1 recites, in relevant part, a laser head comprising “a containment plenum ... wherein the containment plenum is either air-cooled or water-cooled.” Friewald discloses that the flow of ambient air through the vacuum system cools the ablated material. Friewald does not disclose or suggest that the ambient air cools the containment plenum.

Moreover, Friewald discloses at col. 8, lines 7-15 that in some applications of the laser head,

it may be desirable to keep certain ablated substances ... above their dew point until immediately prior to filtration. In instances where elevated temperatures may be desirable, the task can be accomplished with some combination of regulating incoming ambient air, injecting hot air into the optics box, and/or imbedding heating coils in the nozzle and/or delivery hose to the filtration unit.

Therefore, not only does Friewald not disclose or suggest cooling the containment plenum by either air or water, but it teaches that heated air for removing the ablated substances is advantageous in some modes of operation.

For at least these reasons, Applicants submit that Friewald does not disclose or suggest a laser head comprising “a containment plenum wherein the containment plenum is either air-cooled or water-cooled,” as recited in relevant part by Claim 1. Thus, Claim 1 is patentably distinguished over the combination of Uraki, Otsubo, and Friewald. Accordingly, Applicants respectfully request the Examiner withdraw the rejection of Claim 1 and pass this claim to allowance.

Claims 2, 12, 14, 15, 17, 18, and 20 depend from Claim 1. Claims 3, 4, and 5 depend from Claim 2. Claims 6 and 7 depend from Claim 5. Claims 8, 9, 10, and 11 depend from Claim 7. Claim 13 depends from Claim 12. Claim 16 depends from Claim 15. Applicants submit that Claims 2-18 and 20 define over the cited references, either alone or in combination, not only because they depend from Claim 1, but also on their own merit. Accordingly, Applicants respectfully request the Examiner withdraw the rejection of Claims 2-18 and 20 and pass these claims to allowance.

*Claim 19*

Claim 19 recites (emphasis added):

19. A laser head adapted to irradiate an interaction region of an inhabitable structure with laser light to remove material from the structure, the laser head comprising:

means for connecting the laser head to a laser generator;  
means for receiving the laser light from the laser generator;  
means for guiding the laser light to the interaction region; and  
means for confining the material and removing the material from the interaction region, **the confining means being either air-cooled or water-cooled.**

For reasons similar to those discussed above with regard to Claim 1, Applicants submit that the cited references, either alone or in combination, do not disclose or suggest each and every element of the laser head recited by Claim 19. For example, the cited references do not disclose or suggest, "the confining means being either air-cooled or water-cooled," as recited by Claim 19. Therefore, Applicants respectfully request the Examiner withdraw the rejection of Claim 19 and pass this claim to allowance.

**It Would Not Have Been Obvious To Combine Uraki, Otsubo, and Friewald**

Uraki teaches a chamber for use in underwater operation of a laser. See, e.g., Uraki Figure 1. The edges of the chamber are pressed against the submerged surface and water is then evacuated from the chamber by application of a water discharging mechanism 16 and a gas-injecting mechanism 15. Uraki, col. 5, lines 22-34. Uraki then specifies, "With such a mechanism or mechanisms, the above portion of the chamber is mounted in close contact with the surface of the structure so that permeation of water from the surrounding region is prevented." Uraki, col. 12, lines 34-37.

As discussed above, Friewald teaches a cleaning head with a vacuum system that draws ambient air through a nozzle to cool and clear ablated material. See, e.g., Friewald Figures 3A and 3B. The nozzle in Friewald is placed near, but not pressed against, the surface being cleaned. For example, Friewald discloses that "the nozzle rides a few millimeters above the surface being cleaned." Friewald, col. 6, lines 55-57. Indeed, Friewald states, "The cleaning head **must permit some ambient air to enter the nozzle**, in order to cool the ablated material and dilute and entrain the ablated material for easier filtration." Friewald, col. 5, lines 40-44 (emphasis added).

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If the system of Uraki were pulled some distance away from the surface being irradiated, water from the surrounding environment would flood the chamber, preventing operation. Similarly, if the system of Friewald were pressed tightly against the surface being cleaned, it would be unable to draw ambient air from the surrounding environment. Accordingly, it would not have been obvious to modify Uraki using the teachings of Friewald because the system disclosed by Uraki, as modified by Friewald, would be rendered unsatisfactory for its intended purpose. If a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. M.P.E.P. § 2143.01(V). Moreover, the ambient air required by Friewald is unavailable for the system disclosed by Uraki because Uraki teaches use of the chamber underwater. For at least the above-stated reasons, it would not have been obvious to combine Uraki with Friewald.

Thus, Claims 1-20 are patentably distinguished over the combination of Uraki, Otsubo, and Friewald. Therefore, Applicants respectfully request the Examiner withdrawn the rejections and pass these claims to allowance.

#### SUMMARY

For the reasons described above, Applicants respectfully request the Examiner withdraw the objection to the drawings and the rejection of the claims and pass Claims 1-20 to allowance.

The undersigned has made a good faith effort to respond to all of the rejections and objections in the case and to place the claims in condition for immediate allowance. Nevertheless, if any undeveloped issues remain or if any issues require clarification, the Examiner is respectfully requested to call Applicant's attorney in order to resolve such issue promptly.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

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Respectfully submitted,

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